NOTICE

U.S. Department of Transportation
Federal Aviation Administration

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Cancellation
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SUBJ: GUIDELINES FOR THE APPROVAL OF FIELD-LOADABLE SOFTWARE BY FINDING IDENTICALITY THROUGH THE PARTS MANUFACTURER APPROVAL PROCESS

1. PURPOSE. This notice provides guidelines to Federal Aviation Administration (FAA) Aircraft Certification Office (ACO) personnel, Manufacturing Inspection District and Satellite Office (MIDO/MISO) personnel, authorized Designated Engineering Representatives (DER), authorized Designated Manufacturing Inspection Representatives (DMIR), and authorized Designated Airworthiness Representatives (DAR) for approving field loadable software (FLS) using the Parts Manufacturer Approval (PMA) process for identicality. These guidelines are applicable to software data approvals related to type certificate (TC) approvals, amended type certificate (ATC) approvals, supplemental type certificate (STC) approvals, or Technical Standard Order authorizations (TSOA). This notice is for guidance purposes only and is supplemental to document RTCA/DO-178B, "Software Considerations in Airborne Systems and Equipment Certification," dated December 1, 1992.

2. DISTRIBUTION. This notice is distributed to the branch level in Washington Headquarters Aircraft Certification Service, section level in all Aircraft Certification Directorates, all National Resource Specialists (NRS), all ACOs, all Manufacturing Inspection Offices (MIO), all MIDOs and MISOs, and all Flight Standards District Offices (FSDO). Additional limited distribution should be made to the Air Carrier District Offices, the Aeronautical Quality Assurance Field Offices, and the FAA Academy.

3. RELATED PUBLICATIONS.

a. Title 14 Code of Federal Regulations (14 CFR) part 21, "Certification Procedures for Products and Parts," §21.301, §21.303, and §21.305.

b. Advisory Circular 21-33, "Quality Assurance of Software Used in Aircraft or Related Products," dated February 3, 1993.

c. Advisory Circular 20-115, Revision B, "RTCA, Inc. Document RTCA/DO-178B," dated January 11, 1993.

d. RTCA, Incorporated, document DO-178B, "Software Considerations in Airborne Systems and Equipment Certification," dated December 1, 1992.

e. FAA Order 8110.42, "Parts Manufacturer Approval Procedures," dated August 4, 1995.

f. FAA Notice 8110.77, "Guidelines for the Approval of Field Loadable Software," dated November 18, 1998.

4. BACKGROUND.

a. Through technological advances, the loading of software in the field has become a common process. This process reduces aircraft down-time for maintenance and increases efficiency of maintaining airborne equipment.

b. To increase efficiency in accomplishing field loads, it has become desirable for the software developer to obtain approval in order to directly ship the software to the airline or operator. The current policy and guidance for PMA does not address FLS. Software does not fit the traditional concept of a part. The diskette, CD-ROM, etc. serves only as the media that carries a transformable representation of the software's executable image. The desired approval is not for the media, it is for the data on the media after it has been loaded into the target computer (i.e., the executable software itself). Since software does not fit the traditional definition for a part and has some unique considerations, this notice provides additional guidelines to use the PMA process for FLS.

c. This notice only addresses the PMA of FLS by identicality. Due to its controversial nature and potential safety implications, PMA for FLS via the test and computation process is not addressed in this notice. This topic may be addressed in future policy. Should any issues regarding PMA of FLS via the test and computation process arise, please contact the software program manager in the AIR-130 branch at FAA Headquarters.

d. This notice does not address the development aspects of the FLS but focuses on the manufacturing and production issues for PMA of the FLS. Notice 8110.77 addresses guidelines for FLS development and approval and should be applied in conjunction with this notice.

5. PROCEDURES.

a. The PMA is used for replacement or modification parts for sale for installation on a type certificated product. Design approval using the PMA process may be accomplished in two ways: (1) By showing that the design is identical to a previously FAA approved design , or (2) By submitting test results and computations (data) showing that the design meets all applicable airworthiness requirements. As previously stated, this notice addresses the process for approving FLS using the identicality approach. The test and computation approach is not addressed in this notice and may be addressed in future policy.

b. Establishing identicality can be accomplished in one of two ways: (1) by showing evidence that the applicant obtained the design through licensing agreement, or (2) by comparing the applicant's design to a previously approved design. PMA for field loadable software should follow the same procedures as outlined in 14 CFR part 21 and FAA Order 8110.42, with the following additional considerations unique to software:

(1) Finding of identicality by showing evidence of a licensing agreement.

a. Design Approval. Order 8110.42, paragraph 8(a)(3)(a) pertaining to licensing agreement states that the PMA applicant must show "documentation from the TC holder authorizing use of the submitted data package." The following items should be considered for PMA design approval via the licensing agreement method:

(1) FLS to be approved via PMA should have been previously approved by the FAA through the TC, ATC, or STC process and should have the procedures in place discussed in Notice 8110.77.

(2) The approved software may be installed on the aircraft using a Service Bulletin or some other FAA approved means.

(3) There should be a configuration management process in place to assure that the combination of software part number, the hardware part number, the aircraft model(s), and the aircraft serial number(s), as appropriate, is the same combination that was approved during the TC, ATC, or STC process.

b. Design Changes. Order 8110.42, paragraph 8(h)(5) addresses the situation of design changes for PMA. For FLS that was approved via the PMA by showing evidence of licensing agreement, the following guidelines should be applied:

(1) Changes to FLS should be coordinated with the TC, ATC, or STC holder and cognizant ACO to assess if the effect of the change on the aircraft is major or minor. [Note: Major/minor change classification is described in 14 CFR, part 21, subpart D. Additional policy regarding the classification of major/minor software changes is being developed.]

(2) Paragraph 8(h)(5)(a) of Order 8110.42 states that major changes "must be substantiated and approved prior to implementation in the same manner as that for the original PMA."

(3) If the change is determined to be minor, the procedure defined in Order 8110.42, paragraph 8(h)(5) should be followed.

(2) Finding of identicality without a licensing agreement.

a. Design Approval. Order 8110.42, paragraph 8(a)(3)(b) states that the applicant's identicality statement must certify that the "design is identical in all respects to the design of the part covered under an approved design." The following items should be considered for PMA design approval using identicality without a licensing agreement:

(1) The FLS to be approved must be proven to be identical to software previously approved by the FAA through the TC, ATC, or STC process. [Note: The FLS originally approved as part of the TC, ATC, or STC process should have procedures in place as discussed in Notice 8110.77 and Section 12.5 of DO-178B.]

(2) Design identicality may be demonstrated through some form of bit-by-bit check to demonstrate that the software is indeed the same.

(3) In addition to the bit-by-bit check, there should be design evidence available to support the identicality claim. Evidence of design identicality includes availability to all software development and design data required as part of the original approval. The data required by DO-178B or other acceptable means of compliance should be made available to the FAA to assure identicality. This would include such items as software requirements data, design description, source code, executable object code, software configuration index, and software accomplishment summary, as listed in Section 9.4 of DO-178B. The presence of this design data is necessary to demonstrate that the software development process is identical and to support continued airworthiness concerns.

b. Design Changes.

(1) Design changes to FLS by identicality without a licensing agreement should be considered major.

(2) Paragraph 8(h)(5)(a) of Order 8110.42 states that major changes "must be substantiated and approved prior to implementation in the same manner as that for the original PMA."

c. The FAA and designee responsibilities for the PMA for FLS are the same as outlined in Order 8110.42 (i.e., the MIDO/MISO inspector or authorized DAR or DMIR address identicality via licensing agreement; while the ACO engineer or authorized DER addresses other PMA approaches).

6. APPLICABILITY TO TSO. The applicability of the PMA to a unit containing FLS with TSO is the same as discussed in 14 CFR part 21 and Order 8110.42. If the PMA process is used for a unit with TSO containing FLS, it should follow the guidelines of this notice, in conjunction with 14 CFR part 21 and Order 8110.42.

7. CONCLUSION. The information and procedures described in this notice are meant to provide additional clarification and to promote consistent interpretation of the guidelines in DO-178B, Order 8110.42, and Notice 8110.77 for approving FLS by identicality using the PMA process. This notice does not replace or supersede AC 20-115B, DO-178B, Order 8110.42, or Notice 8110.77.

<<Original Signed by James C. Jones on 2/22/99>>

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